

The Service Infrastructure of Communities

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Leaders in rural communities in the Southern States and in the nation are seeking economic growth and development. Before economic growth and development can occur, quality infrastructure and community services must be available. Research documents the fact that there is a relationship between infrastructure and economic development.

A comprehensive review of the literature that looked at the relationship between infrastructure and economic development by McGuire [24] concluded:

“The most striking aspect of this report is the paucity of empirical evidence specifically investigating the linkage between economic development and infrastructure investment. Several well-designed, information empirical studies with varying degrees of relevance to the linkage were examined. ...the evidence appears to be that there is a positive and perhaps strong relationship between infrastructure investment and economic development” [7].

Selected research results illustrate the importance of quality community services. For example, the research relative to industrial and business location decisions indicates that the most important community service considerations are schools and health services. Research that measures the decisions of retirees indicates that the most important community services in their location were safety and health. Based on the conclusion that infrastructure community services are crucial for economic growth, it is imperative that community leaders plan for providing quality community services. The overall objective of this chapter is to demonstrate how rural development specialists can assist community leaders in planning infrastructure and community services. More specifically, the objectives are to:

1. provide an overview of comprehensive planning for a specific vector, and
2. illustrate how rural development specialists can evaluate community service alternatives.

The Community Planning Process

In the past, community service planning has often been done when a crisis occurs. For example, in the 1970s funeral home operators stopped providing emergency medical services (EMS) and if a community was to have EMS, it had to find a way to produce the service. In the 1990s, Federal regulation imposed on landfills forced many of them to close. Again, crisis management forced community leaders to address the issue if these services were going to be available. Currently, many rural hospitals are in serious financial trouble, and again crisis management is imposed to keep them afloat. Crisis situations will continue to occur, and rural development specialists must be prepared to assist community leaders. A better approach is to encourage leaders to be proactive and conduct planning before a crisis arises.

A brief overview will be given of a health planning process. This approach can be used for any service. The assistance that a rural development specialist can provide in evaluating alternatives will be emphasized. The health planning approach currently used in Oklahoma will be used as an example.

Strategic Health Planning is a Process

For complete details of the process, see planning guidebook, Oklahoma State Department of Health Guidebook on Strategic Health Planning in Oklahoma Communities.

The process assists local communities to identify their health care needs; to examine the social, economic, and political realities affecting the local delivery of health care, to determine what they want and realistically can achieve in a health care system to meet their needs; and to develop and mobilize an action plan based on their analysis and planning. Strategic health planning involves cooperation among people and organizations to pursue common goals. The process is designed to answer three questions: (1) where is the community now?, (2) where does the community want to go? and (3) how will the community get there? The process should be started when community citizens have a shared need for health care, when community leaders can be mobilized to take action, and when a Resource Team or facilitating group can be identified to assist the community to carry out the process.

The strategic health planning process must be “community driven.” The community, as represented by the leaders, must “own” or “drive” the process. It should be community-based, not hospital-based or health care provider-based. Local residents and their leaders must come forth. A current knowledge of the health care industry is not necessary. This process is about local people solving local problems. The local hospital and health care providers should have input into the process and should support and “trust” the process, but the community must provide the energy and commitment.

The strategic health planning process is outlined in Figure 1 and begins with a group of citizens of a community becoming interested in reviewing and analyzing the health care system of the community. This group of citizens is the initiating group (Figure 1). Often, this may result from a change in the current health care delivery system, such as the loss of a physician or a hospital or a change in the type of services or facilities offered. A community that is not currently experiencing changes or problems in their health care system can also benefit from strategic health planning by enhancing or improving the current system. The initiating group of citizens will form a Community Health Steering Committee to work through the process of strategic health planning, developing a plan, and implementing the plan.

The Community Health Steering Committee will work closely with an outside Resource Team. The Resource Team consists of representatives from the Oklahoma State Department of Health, the Oklahoma Office of Rural Health, the appropriate Area Health Education Center (AHEC), the Oklahoma Cooperative Extension Service, and the University of Oklahoma Health Sciences Center. The goal of the Resource Team is to create an interagency Resource Team available to assist Oklahoma rural communities with health planning and to create a process for rural communities to use to enhance local health care systems. The Resource Team offers technical assistance to the local community with the development, presentation, and analysis of data and information, surveys, and health services and facilities as well as with analytical skills, facilitation skills, and strategic planning skills. The utilization of an outside Resource Team is necessary because as the Resource Team is trained in the community development process and has health sector expertise. The Resource Team also has contact with other agencies who may be able to provide special technical assistance and other resources.

Communities must fully understand their health care needs, as well as other factors that influence how health care services are provided, in order to make wise decisions in the planning process. To develop a strategic health plan, the Community Health Steering Committee will need information and data about the community and will need to communicate with the community.



As specified in Figure 1, the Steering Committee will divide into five task forces, which include:

- ❖ Publicity;
- ❖ Health Services and Facilities Inventory;
- ❖ Community Survey;
- ❖ Data and Information; and
- ❖ Health Resources Coordinating.

The Publicity Task Force will provide news articles, radio announcements and other public notices, including meeting notices for the Community Health Steering Committee.

The Health Services and Facilities Inventory Task Force will gather detailed information on all health services and facilities provided within the community. A result of this task force could be a directory of health services and facilities in the community. The Resource Team can be helpful in gathering the basic health services and facilities data. However, the committee members will know the local services and facilities first-hand and will be critical in determining the accuracy and completeness of the directory.

The Community Health Survey Task Force will design a survey, have the survey conducted and analyzed, and review the results of the survey analysis. This task force will determine the local community's opinions and needs related to the health care system by obtaining input and feedback from the community. The Community Health Survey Task Force will review the community survey results to determine the need for further community analysis of specific needs. The Resource Team can assist with conducting and analyzing a survey and can assist with the determination of the need for further community analysis.

The Data and Information Task Force will gather and analyze all current sources of data and information about the community's health care system. Demographic, economic and health data and information are available from many different sources. The Resource Team can be helpful in gathering, presenting and analyzing this data and information.

The Health Services Organization Task Force will be formed only if needed within the specific community. This task force will review the health services organizations within the designated health service area and look for optimal efficiency in provision of health care services to meet the community needs.

After the task forces (except for the Publicity Task Force) have completed their research and analyses, a final report with main points of emphasis from each task force will be presented to the complete Community Health Steering Community. The information from these four task forces will be reviewed, integrated and duplications eliminated. The Steering Committee will then determine the main points of emphasis to build a plan of action.

Research may be needed on some of the points of emphasis to determine what course(s) of action is(are) feasible. The Resource Team can assist with developing further information related to specific points of emphasis. Some examples of research requests based on the planning process in Oklahoma are:

- ❖ feasibility studies for family practice physicians, OB-GYN specialists and pediatricians;
- ❖ feasibility study for outpatient rehabilitation services; and
- ❖ feasibility studies for adult care services.



After all items have been thoroughly research, the Community Health Steering Committee will review the final information. A proposed plan of action will be completed with a timetable and specific steps of action for implementation.

The proposed plan of action will be shared with the community through a community-wide meeting (Figure 1) and through the news media. The communication and acceptance of the plan of action by the community is crucial for accomplishing results. All members of the community should have an opportunity to provide input for discussing, updating and/or altering the plan. The Community Health Steering Committee will then modify and revise the plan. The final plan will include specific community assignments and deadlines. A system for reviewing the results of the plan of action must be determined, and follow-up is important for accomplishment of the plan.

The strategic planning process has been completed or is in process in about 20 counties or communities in Oklahoma. The process takes about nine months and is labor intensive as the Resource Team provides the data and guides the entire process. The outcomes have been exciting as the entire community gets involved in the process, and changes have and are occurring. Some examples of changes are:

- ❖ attraction of a OB-GYN physician;
- ❖ attraction of a pediatrician;
- ❖ establishment of a rural clinic;
- ❖ creation of an assistance living center;
- ❖ educational program to address teenage pregnancy problems; and
- ❖ establishment of an outpatient adult care center.

Another side benefit which occurs is that the planning brings together the providers and this often results in coordination and cooperation in the delivery of services. The end result of the planning process is an involved and enthusiastic community, often with more health services being provided at the local level. This greatly improves the quality of life for the residents and makes for a more viable community.

Evaluating Community Service Alternatives

As the community moves through the planning process or a crisis occurs, a budget study of alternatives is often requested. Rural development specialists can offer a tremendous service by conducting an evaluation of alternatives.

The methodology for budget studies is quite simple and is outlined in Table 1. The first major section deals with estimating need and usage of a community service. Often need is a function of demographics and population by age and sex. In planning services with huge capital investments, future demographics need to be estimated and included in the analysis.

For the Oklahoma budget studies, local and national data have been employed to estimate Oklahoma usage coefficients. These coefficients then estimate community service usage. The second component is the estimation of capital costs. For the Oklahoma studies, operators and capital dealers were interviewed to derive capital needs and costs. The operators also provided detailed operating costs. From this information an annual capital and operation budget was estimated. Finally, the revenue must be estimated. In some cases, this includes revenue only from user fees. In others cases, revenues may come from user fees and taxes.



Example Budget Analysis – Outpatient Rehabilitation Study

Estimating Need. The first question to answer is how many visits to an outpatient rehabilitation facility would a given health service area generate? National data indicate that there are 300 office visits per year per thousand population. To determine how rural Oklahoma compared to this usage coefficient, an outpatient rehabilitation facility in Oklahoma was interviewed. During the facility's second year of operation, they experienced about 240 visits per year per thousand residents in their service area (Table 2).

If these usage coefficients are applied to the Tahlequah service area, the range of annual visits would be from 8,094 to 11,130 (Table 3). The assumption is made that the service area for Tahlequah is all of Cherokee County which contains 37,100 residents. For planning purposes, it might be wise to use the low number and allow a facility to expand if usage equaled the upper range.

Estimating Capital and Operating Costs. Capital items include a building and equipment. A building could be rented and remodeled, or a new building could be constructed. Since rental options and construction costs are specific to a local community, these were not estimated. Equipment costs were estimated at \$200,000 (Table 4) and derived from the information provided by the Oklahoma outpatient rehabilitation facility.

Partial operating cost data are provided in Table 5. It is incomplete because time has not allowed the authors time to gather this data. It was extremely clear from discussions with national, state and local professions involved with outpatient rehabilitation facilities that an experienced physical therapist is required. To get a quality physical therapist, a minimum salary of \$50,000 to \$60,000 would be required. The physical therapist will then utilize assistants to provide services. An assistant will cost about \$25,000 per year. In addition, technicians, receptionists, etc., will be needed to operate the facility.

An Example. A preliminary analysis of costs, revenues and profit of a facility in Tahlequah is presented in Table 6. Most of the assumptions are conservative, as it is better to error on the low range. For this feasibility analysis, it was assumed there would be 8,000 annual office visits. Data from rural Oklahoma indicate that the average charge is \$95 per visit. For planning purposes, 42 percent is assumed uncollectible. This percentage is based on payments by Medicare, Medicaid, workers compensation, private insurance and uncompensated care. Most professionals felt this percentage was actually too high. Based on these assumptions, revenue collected was estimated at \$441,000 or \$52.12 per office visit.

Costs include an annual charge for depreciation of building or equipment. If the building was rented, it would be an operating expense. The equipment was assumed to have a 10 year life, and, therefore, straight line annual depreciation would be \$20,000. Total depreciation costs were projected at \$30,000. Annual operation costs are primarily personnel. For this analysis, it was assumed there was one physical therapist, two physical therapy assistants, one technician and one reception/bookkeeper. If a 30 percent benefit package is included, total labor costs would be \$179,400. Since other operating cost data was limited, these were mainly educated guesses and thus inflated. The miscellaneous costs are large because of missing items such as malpractice insurance. It was felt for this analysis that we wished to error on the high side and thus chose a miscellaneous figure of \$50,000. Total annual capital and operating costs were estimated at \$279,400 or \$34.92 per office visit. Based on these assumptions, an outpatient facility in Tahlequah should net about \$161,600 annually.

Example Budget Analysis – Adult Day Care Facility Study

Community leaders in Madill, Oklahoma, identified a need for an adult day care facility. Madill is the county seat community in Marshall County located in south central Oklahoma. The 1995 population of Marshall County is 11,700 with 2,691 residents estimated to be 65 years of age or older.



Estimated Daily Participants. Two major questions must be answered before proceeding with the planning stages of an adult day care facility. How many potential participants will a given service area generate? How many of these needing the service will be willing to attend the center? This number can deviate depending on the mix of participants accepted and the type of programs offered. Expected length of participation will vary as well. Some participants will only use the service for a short rehabilitation period following surgery, while others will have a more long-term association. Adult day care participants can usually be categorized into three groups: physically or mentally impaired elderly, adults diagnosed as developmentally disabled, and adults with chronic mental illness [32]. The client base and mix will depend on the desires of the center. Because the majority of adult day care facility clients are elderly, the need assessment for Madill only included the segment of population over 65. If specialization or diversification is desired, the expected need might change slightly.

National data indicate that approximately 15 percent of the older adult population is sufficiently impaired and could benefit from the services provided at an adult day care facility, but for various reasons only 1.25 percent can be expected to actually use them [19]. The assumed service area was Marshall County. Based on the U. S. Bureau of Census, the 1995 population for the 65 and older population in Marshall County is 2,691. If usage coefficients are applied to the estimates, an estimated 34 (2,691 x 0.0125) people would use the center. If participation attendance averaged three days per week, the Marshall County service area could generate 5,304 annual participant days (34 participants x 3 days per week x 52 weeks per year). Most centers are operating five days per week and are closed on Thanksgiving Day, Christmas Day, New Year's Day, Memorial Day, Labor Day and the Fourth of July. Therefore, daily full-time equivalent (FTE) demand would be approximately 21 participants (5,304/254 days per year). For planning purposes, it is usually better to start conservatively and then expand as information and reputation increases usage. For this analysis, two different budget alternatives will be discussed. Alternative 1 will be based on an adult day care facility with an average of five FTE participants per day. Alternative 2 will be based on an adult day care facility with an average of ten FTE participants per day.

Projected Capital and Operating Expenses. When considering an adult day center, the annual budget needed to provide for continued operations is a major concern. The cost data used in this section are estimated average costs based on an analysis of the actual Fiscal Year 1995 operating budgets for six adult day centers, as received from the Oklahoma Inspector General's Office. These are the best cost estimates currently available. However, if local decision makers know actual costs, the actual costs should be substituted into the budgets in this section.

Capital expenditures for an adult day care facility will include furnishing the main activity room, a reception area, the director's office, other staff offices, kitchen facilities, a medical room, and an exercise room.

Detailed listings of the furnishings for each of these areas are available in the original document [17]; however, for the purpose of illustrating the budget analysis, this detail has not been included. Estimated cost of the furnishings are shown in Table 7 for the two alternatives - Alternative 1 for a center with five participants and Alternative 2 for a center with ten participants. The total capital expenditures for Alternative 1 are estimated at \$17,345 and for Alternative 2 at \$24,095. The difference between the two alternatives are the number of specific items needed in Alternative 2 to serve the larger number of participants.

The capital expenditures can be significant, especially in the first year of operation. If capital is not available, an agreement with a local financial lender will be required. If a loan is acquired, the investment can be paid over a period of time at a guaranteed rate. Annual loan payments must be included as annual operating expenses. In contrast, revenue sources will need to be available to purchase the required capital items. In this case, the case expense for capital items will not occur in the second year of operation. Thus, in subsequent years, costs to the adult day care facility will be lower.



To estimate annual capital expenses (Table 8), a depreciation fund should be maintained to accumulate replacement costs for new equipment purchases. For the purposes of budgeting for capital equipment, it has been assumed that the average life for all capital items is ten years, based on a straight-line depreciation schedule. Therefore, one-tenth of the overall capital expenditure amount should be placed in a depreciation fund each year to be available to replace the capital equipment items as needed in the future. The depreciation of capital expenditures is estimated to be \$1,735 for Alternative 1 and \$2,410 for Alternative 2.

Annual operating expenditures are also shown in Table 8. Facility costs are included in operating expenditures. If construction is required, all expenses should be managed and depreciated as capital expenditures. For this analysis, it is assumed that rent agreements for available space will reduce the required capital expenditures. Building rent has been estimated for each alternative, \$4,800 and \$7,200, respectively. Additional costs for the facility would include utilities for an annual cost of \$4,200 and \$6,000, respectively, for the two alternatives. A phone is estimated at \$75 per month, for a total of \$900 for each alternative.

The largest expenditure of an adult day care facility are the personnel costs, including a director (\$2,000/month); a secretary/receptionist (\$5/hour); a licensed activity director (\$6/hour); a licensed practical nurse (LPN) (\$8.50/hour); a social services director (\$7.50/hour); dietary supervisor (\$6/hour); certified medical aides/program aides (\$5.50/hour); and maintenance personnel (\$5/hour). Benefits are calculated at the rate of 15% of the total personnel costs. For Alternative 1, the estimated personnel costs are \$32,782 with personnel benefits of \$4,917. For Alternative 2, the estimated personnel costs are \$47,662 with personnel benefits of \$7,149.

Each adult day care facility is custom-tailored to meet the needs of the participants of the center. Specialty services may be needed in the form of physical therapy, mental health counseling, speech pathology, etc., depending on the needs of the individual participants at a particular center. These costs are not included in the budget alternatives, as they will vary greatly from center to center. These costs also may be obtained on a volunteer basis or on a flat fee basis. Each facility will need to estimate these costs locally.

Staff development costs are estimated to be \$300 for Alternative 1 and \$500 for Alternative 2. Supplies are necessary and include medical, office, program activities, advertising and other miscellaneous as needed. Supplies are estimated to be \$1,500 and \$2,500, for Alternative 1 and 2, respectively. An insurance category is necessary to cover liability for the staff and the patients. Insurance is estimated at \$1,500 and \$1,800, for Alternative 1 and 2, respectively. An accounting/legal fee is allotted to cover necessary audits and legal advice. Accounting/legal fees are estimated to be \$1,300 for Alternative 1 and \$2,000 for Alternative 2. Meals and snacks are budgeted and could vary greatly depending on whether this service is contracted out or provided internally. Due to necessary diets for participants, most centers contract out for the lunch meal. Meals/snacks are estimated to be \$4,500 and \$8,900, for Alternative 1 and 2, respectively. A miscellaneous category is included to cover any other extraneous costs - \$1,000 for each of the alternatives.

The total annual operating costs for Alternative 1 are estimated to be \$57,699 and \$85,611 for Alternative 2 (Table 8). The annual capital and operating expenses for Alternative 1 total \$59,434 and \$88,021 for Alternative 2 total. The cost per participant per year for Alternative 1 is an estimated \$11,887 and for Alternative 2 is an estimated \$8,802. For Alternative 1 the cost per participant per day is an estimated \$46.80 and for Alternative 2 is an estimated \$34.65.

Estimated Revenues. Estimated revenues for the proposed Madill adult day care facility are based on \$25 per day participant fees. The economic eligibility or ability to pay for the services will vary significantly among participants. Some will fully fund their visits while others will qualify for DHS (Title XX) reimbursement.



Participants that pay for the services without assistance are called private pays. However, operators of Oklahoma adult day care facilities expressed that the majority of their participants are receiving some level of assistance. If a participant's financial welfare is low enough, they can receive full reimbursement (currently based on \$25 per day). Those participants that qualify for assistance but do not qualify for full reimbursement will have a co-payment based on their income. According to DHS, the average co-payment is \$7. Two other typical reimbursement programs are veterans entitlements and mental clinic referrals. Both programs contribute reimbursement based on \$25 per day. Currently, reimbursements from Medicaid are not available for adult day care services in Oklahoma.

The estimated annual revenues from patient fees (including reimbursements) are presented in Table 9. It was estimated that 90 percent of the participants qualify for some assistance, while the remaining 10 percent of the participants will be private pay. Of those participants qualifying for assistance, 20 percent qualify for full reimbursement and the other 70 percent will be responsible for a co-payment. There was no distinction made as to the specific reimbursement program since most programs use a \$25 per day rate.

Total charges for a center open 254 days would be \$31,750 (5 x \$25 x 254) with five FTE participants in Alternative 1 and \$63,500 (10 x \$25 x 254) with ten FTE participants in Alternative 2. However, some level of uncollected fees should be included. Periodically, participants will not be able to contribute their co-payment. To manage daily attendance and to provide the service to those that need it, operators of adult day care facilities rarely turn participants away for lack of ability to pay. For this analysis, it was assumed that 40 percent of the co-payment revenue would not be collected. Therefore, total revenue from patient fees is \$29,616 with five FTE participants for Alternative 1 and \$58,522 for a center with ten FTE participants for Alternative 2. With total operating and capital expenses from Table 8, it is not possible to break-even with only participant fees. Supplemental funding alternatives must be acquired. An adult day care facility providing services for five FTE participants will require \$29,818 supplemental assistance while an adult day care facility providing services for ten FTE participants will require \$29,499. It must be emphasized that this is a preliminary analysis based on assumptions of service area, services provided and client base and mix. Specialization and/or diversification decisions could increase or decrease utilization rates, as well as increase or decrease annual costs.

Available Budget Studies

These examples clearly demonstrate the need for an accurate analysis of each issue. As community decision makers face each issue, it may be useful to know where research such as feasibility studies has been completed. The basic data behind these studies will transfer to other communities and make the job of analyzing an issue much easier. The subject areas where analysis has been completed are presented in Table 10. The subject areas include emergency medical services, fire, solid waste, physicians, transportation, clinics, adult day and outpatient rehabilitation.

Other Community Service Type Studies

Besides the basic budgets which provide information as to capital and operating costs and revenue sources, other questions arise with which OSU can provide assistance. Some of these include:

- ❖ where to locate ambulance or fire vehicles to provide maximum protection;
- ❖ how many EMS or fire crews to have on duty;
- ❖ what are the most efficient bus or solid waste routes; and
- ❖ how much revenue will be generated by alternative rate schedules.



Each of these can be addressed with a computer model. Since time is limited, only a school bus routing problem and a water rate analysis will be presented.

School Bus Problem

Due to limited funds, the leaders from the Beaver School District contracted OSU Cooperative Extension Service to see if they could reduce their number of rural bus routes. (For a copy of complete study, see Kleinholz, July 1987.) Currently, they have five routes and desire to reduce this number to four. Current routes are depicted in Figure 2. The beginning of each route is designated by a "D" which signifies where the driver lives. The bus stops are numbered from 1 to 55. A summary of the stops is presented in Figure 2 as well as in Table 11. The assumptions made for the analysis are that the bus must be at school by 8:15 a.m., the time allowed per stop is one minute, and the buses travel 30 miles per hour, except from the last pickup to the school where they travel 55 miles per hour. The pickup times for each student on each route are given in Table 11. In order for students to get to school by 8:15 a.m., the bus on Route 1 must pick up students as early as 6:25 a.m. The number of stops per route changes from eight to 13 (Table 11). Minimum distance traveled per route is 28.75 miles; maximum distance is 54 miles. The time required to travel a route ranges from a minimum of 67 minutes to a maximum of 119 minutes with the earliest starting time at 6:16 a.m.

An alternative with four routes is depicted in Figure 3 and summarized in Table 12. The number of stops per route varies from 12 to 16. Minimum distance traveled per route is 43.75 miles; maximum distance is 54.5 miles. The time required to travel a route ranges from 103 to 110 minutes with the earliest starting time at 6:25 a.m. Only four buses are needed.

To obtain these four routes, one driver had to be eliminated. Drivers at stops 1 and 9 were closer together than any other two drivers and so, could be placed on the same route. In this case, the driver at stop 9 was assumed eliminated from Route 1.

Utility Problem

Another important community service needed to promote economic development is water. Rural water districts and rural communities are attempting to provide the quality and quantity of water necessary for their customers. OSU Cooperative Extension Service can aid their planning efforts by projecting water needs, estimating capital and operating costs, and analyzing rate schedules. Thus, only the rate schedule program will be presented here. This example is for Sallisaw, but the program works for any rural water system.

Current Rate Schedule

Under the current water rate schedule, the minimum charge for customers is \$2.50 for the first 2,000 gallons each month. Charges for additional use are 5 cents per 100 gallons for the next 8,000 gallons, 4.5 cents per 100 gallons for the next 10,000 gallons, 4 cents per 100 gallons for the next 30,000 gallons, and 3 cents per 100 gallons used over 50,000 gallons. The summary of estimated revenue and water used by month for Sallisaw customers generated \$101,971 from December 1985 through November 1986 (Table 13). Total usage for that time period was 110,717,000 gallons.

Alternative 1. In this alternative, the minimum charge for customers is \$2.50 but usage over 2,000 gallons are raised to 14 cents per 100 gallons between 2,000 and 10,000 gallons, 13 cents per 100 gallons between 10,000 and 20,000 gallons, 11 cents per 100 gallons between 20,000 and 50,000 gallons, and 10 cents per 100 gallons for usage above 50,000 gallons (Table 14). Estimated revenue is \$162,553, a 159 percent increase from revenue generated with current rates.



Alternative 2. Minimum charges in this alternative remain at \$2.50 (Table 15). Charges for usage over 2,000 gallons was raised 1 cent in the first two categories and two cents in the second two categories from charges in Alternative 1. Estimated revenue is \$169.983 - a 167 percent increase from revenue generated with current rates.

Economic Impact Assessment

More and more questions are being asked about the economic impact of changes in a community's economy. Community analysis of changes in the economic base often focus on accounting exercises examining differences in tax collections and direct expenditure. This balance sheet approach captures the direct impact of the change in the economic base and ignores the secondary or multiplier effects.

Community leaders are asking for information on the different abilities of economic activities to generate new jobs and income. Leaders desire to know the impact of many changes in their economic base. This ranges from closing a hospital to attracting a large industrial plant. A model or methodology to measure changes in the economic base is needed. This section of the chapter will:

1. review the basic concepts of community economics;
2. present an overview of the model;
3. provide three example applications; and
4. present a summary of the model's applications.

Basic Concepts of Community Economics

Industries or businesses that produce goods primarily for sale outside the economy are called basic industries. They are important components of all economic systems. Two other major components of economic systems are service firms and households. Figure 1 illustrates the major flows of these sectors within any economy.

Basic industries purchase labor from households and reimburse them with dollars. Other inputs used by basic industries are purchased from local service firms and service from outside the area. Local service firms also provide goods and services to households (consumers). Each of these three components of an economy purchase goods and services from outside the economy. Local transactions determine the relationship that exist among the various firms in an economy. For example, consider what the impact of a proposed recreational lake would have on the economy of a county. The lake could be considered a basic industry if it draws visitors from outside the county. Visitors would purchase goods and services from the service sectors including

food, gasoline, hotel rooms and other items. As income is generated in these businesses, they would hire additional employees and buy more inputs from other businesses.

The total impact of any basic industry on an economy consists of direct, indirect and induced impacts. Direct impacts are the immediate effects of the impacting industry; for example, the jobs created to fill certain positions within the firm and the payroll to pay those new employees. Indirect impacts are the effects that occur in the sectors as a result of the input purchases made by the impacting industry. Induced effects are the changes in other sectors brought about by the increased consumer spending due to the initial direct and the following indirect effects. In brief, the initial jobs are created, and income is spent in ways that tend to create further employment and income in other sectors of the local economy.

The above discussion indicates how basic industries serve as the foundation of an economy and how households and service firms are necessary to make the economy function. Service industries account for a substantial part of the outputs of most economies. But, as Figure 1 shows, much of the service industries' output



supports the local basic industries and households. Mathematical techniques can be used to measure the relationships between basic industries, households, and services.

Type III multipliers are used for this study. The Type III multipliers compare direct, indirect and induced effects to the direct effects generated by a change in final demand. A Type III retail sales multiplier of 1.5 indicates that if one dollar is generated by tourist activity, then an additional 50 cents will be generated due to business (indirect) and household (induced) spending.

The most frequently used types of multipliers are those that estimate the effects of (1) outside changes in output of the sectors in the economy, (2) income earned by households because of the new outputs, (3) value-added generated from the production of new output, and (4) employment that is expected to be generated because of the new outputs. Value added includes employee compensation, proprietary income, other property type income, and indirect business tax. Employment is generally measured in terms of the number of jobs.

The multiplier effect indicates the relationships between some observed change in the economy and the amount of economic activity that this change creates throughout the economy. The income multiplier measures the change in income that is created by some increase or decrease in the economy. For example, suppose the region has an income multiplier of 2.8 and a new plant puts \$1 million worth of income into the hands of those operating and those employed by the firm. The multiplier effect indicates that this initial increase in income will swell to \$2.8 million worth of income as the secondary repercussions are felt throughout the region's economy. These secondary repercussions are measured by the indirect and induced impacts discussed above. Similarly, if employment is increased or decreased, the employment multiplier indicates how this change will affect the rest of the economy. Suppose the region has an employment multiplier of 2.4 in the manufacturing sector. If a manufacturing plant which would employ 1,000 labor workers is built in this region, the total employment impact for the region will be 2,400 jobs including the new plant's labor force.

Multipliers for various types of industrial activities are expected to differ. The industrial activity of an area can be classified into three broad categories. First are the basic industries such as livestock, farming, mining and forestry. These industries depend on and are directly related to the natural resources of the region. Second are the industries which process the raw materials of the basic industries. Industries in this manufacturing category include food products, flour mills, oil refining, livestock processing, etc. The third stage industries arise to meet the needs of the other industries and include businesses such as wholesale and retail stores, transportation, communication, etc.

An Overview of the Model

The model used for measuring the impact of changes in the economic activity of a community is input-output (I/O). Professionals from the U.S. Forestry Service developed an I/O model and with secondary data have created a model for each U.S. county. The combined data are referred to as IMPLAN (Impact Analysis for Planning). A brief overview will be presented of I/O and IMPLAN.

Input-Output Analysis

Input-output (I/O) [25] was designed to analyze the transactions among the industries in an economy. These models are largely based on the work of Wassily Leontief [23]. Detailed I/O analysis captures the indirect and induced interrelated circular behavior of the economy. For example, an increase in the demand for health services requires more equipment, more labor and more supplies, which, in turn, requires more labor to produce the supplies, etc. By simultaneously accounting for structural interaction between sectors and industries, I/O analysis gives expression to the general economic equilibrium system. The analysis departs from reality because of linear and fixed coefficients and lack of opportunity for substitution among inputs and outputs.



The analysis also assumes that average and marginal I/O coefficients are equal. Nonetheless, the framework has been widely accepted and used. I/O analysis is useful when carefully executed and interpreted in defining the structure of a region, the interdependencies among industries, and forecasting economic outcomes.

The I/O model coefficients describe the structural interdependence of an economy. From these coefficients, various predictive devices can be computed, which can be useful in analyzing economic changes in a region. Multipliers indicate the relationships between some observed change in the economy and the total change in economic activity created throughout the economy.

IMPLAN

IMPLAN is a microcomputer program developed by the U.S. Forestry Service [3] to construct regional I/O accounts and models. Typically, the complexity of I/O modeling has hindered practitioners from constructing models specific to a community requesting an analysis. Too often, inappropriate U.S. multipliers have been used to estimate local economic impacts. In contrast, IMPLAN can construct a model for any region in the United States by using available state and county-level data. Impact analysis can be performed once a regional I/O model is constructed.

Five different sets of multipliers are estimated by IMPLAN, corresponding to five measures of regional economic activity. These are: total industry output, personal income, total income, value-added and employment. Two types of multipliers are generated. Type I multipliers measure the impacts in terms of direct and indirect effects. Direct impacts are the changes in the activities of the focus industry or firm, such as the closing of a hospital. The focus business changes its purchases of inputs as a result of the direct impacts. This produces indirect impacts in other business sectors. However, the total impact of a change in the economy consists of direct, indirect, and induced changes. Both the direct and indirect impacts change the flow of dollars to the community's households. Subsequently, the households alter their consumption accordingly. The effects of the changes in household consumption on businesses in a community is referred to as an induced effect. To measure the total impact, a Type III multiplier is used. The Type III multiplier compares direct, indirect and induced effects with the direct effects generated by a change in final demand (the sum of direct, indirect and induced divided by direct). IMPLAN estimates Type III-induced effects based on the changes in employment and population to minimize the overestimation that occurs with a linear consumption function [3]

IMPLAN contains data for 528 economic sectors specified under the Standard Industrial Codes (SIC). Thus, it is easy to measure specific community impacts. Furthermore, sectors can be aggregated to build a smaller model. Likewise the data are at the county level and can be combined to reflect multi-county impacts.

Application of IMPLAN to Community Issues

To demonstrate the range of application of IMPLAN, three applications have been selected. These include: (1) measuring the impact of the health sector, (2) the impact of fairgrounds, and (3) the impact of a new industry.

Impact of the Health Sector

A model to estimate the economic impact of the health sector has been developed by Doeksen, Johnson, and Willoughby [7]. It uses data and regional tools that are available at the county level. Noble County, OK, will be used to demonstrate the model. The county is located in central Oklahoma and has about 11,000 residents. The model has five health sectors which include hospital; physicians, dentists and other professionals; nursing homes and other residential facilities; other medical and health services; and pharmacies. Employment and payroll information associated with each sector needs to be locally collected. For Noble County, the data are presented in Table 16. These are referred to as the direct economic activities and do not include the



secondary benefits which arise due to employee and business spending. In Noble County, there are 65 people employed by the hospital and 36 by physicians, dentists, and other professional offices. Total health sector jobs are 231 with a payroll of \$5,031,468.

The secondary benefits are measured by county employment and income multipliers. These multipliers measure all secondary impacts of the health sector dollars as they flow through the county. The multiplier and impacts on Noble County are presented in Table 17. The data in Table 17 clearly demonstrates the impact for each health sector and for Table 16.

For example, the hospital has 65 employees, and the IMPLAN multiplier for that sector is 1.46. Total employment impact is 95. Total income from the hospital activities is \$2,239,727; retail sales \$671,918; and three cent sales tax collections are \$20,157. The total impact of the health sector on the economy is 363 jobs, \$7,064,881 in income, \$2,319,464 in retail sales, and \$63,585 in sales tax.

The procedure has been applied to nine Oklahoma Counties within the past year. Summary statistics are provided in Table 18. Key results from these studies include:

- ❖ about nine percent of all employment is directly working in the health sector;
- ❖ about 14 percent of all employment is attributed to the health sector;
- ❖ employment multipliers ranged from 1.30 to 1.81;
- ❖ income multipliers ranged from 1.45 to 1.87;
- ❖ hospitals are often the second largest employer in the county; and
- ❖ nursing homes created a very large number of jobs.

It is clear that the economic impact of the health sector on these counties is tremendous. If the health sector increases or decreases in size, the medical health of the county as well as the economic health will be greatly effected. For the attraction of industrial firms, businesses and retirees, it is crucial that the area have a quality health sector. Often overlooked is the fact that a “healthy” health sector greatly contributes to the economic health of the county.

Impact of County Fairgrounds

This portion of the paper taken from Doeksen, Hutchins, St. Clair, and Ralstin [5].

Local decisionmakers often ask the question as to what is the economic impact of a fairground on a local economy. A study for Grady County in southwest Oklahoma was completed for county leaders. The Grady County Fairgrounds activities have an extremely large direct impact on Chickasha and Grady County. The direct effects will be divided into two components for analysis and discussion. These include: (1) the impact of the fairground’s employees and (2) the impact of visitors spending on the economy.

Direct Impact of Employees

The fairgrounds employs one full-time and one half-time employee. Data from the fairground’s records indicate this employment results in a payroll of approximately \$27,000.

Direct Impact of Visitor Spending

To estimate visitor spending, the number of events and attendances had to be summarized. The distribution of events and activities for the Grady County Fairgrounds for 1995 is presented in Table 19. The largest attended events were three antique car swap meets. Other frequent activities included the local and county fair, three rodeos, and three arts and craft shows.



Data in Table 20 summarizes the advanced bookings at the Grady County Fairgrounds for 1996. Again the three antique car swap meets are estimated to be the largest bookings. To estimate the impact for 1996, an assumption was made that the events and visitors will increase another 10 percent above the current bookings. The total number of visitors is estimated to be 216,800; of this total 27,575 are local visitors and 189,225 are out of town visitors. With the 10 percent additional above the current bookings, the total number of visitors is estimated to be 238,480, of which 30,332 are estimated to local and 208,148 are estimated to be out of town.

After estimating the number of visitors, it is necessary to estimate their daily expenditures. The best way to do this would be with a survey of visitors. However, since time did not permit this, three different expenditure levels were used for daily local visitors, daily out of town visitors and overnight visitors. These are presented in Table 21. If daily local visitors total 30,332, and each spent \$10 per day, their total annual expenditures would be \$303,320. If daily out of town visitors total 187,334, and each spent \$10 per day, their annual expenditures would be \$1,873,340.

A number of visitors will spend the night. This is extremely difficult to estimate. There were several multi-day events, and from this information an estimate of 20,814 overnight visitors was assumed. If overnight visitors spend \$50 per day, then \$1,040,700 would be generated. Annual visitor expenditures at the local daily rate of \$10, out of town daily rate of \$20, and overnight rate of \$50 would total \$5,090,700.

The visitor expenditures total had to be converted to jobs and income. This was accomplished by employing the employment expenditure ratio for the retail trade sector; finance, insurance and real estate sector; and service sector from the Grady County Input-Output model. Employment due to visitor spending was estimated at 141 jobs (Table 22). To project payroll of these employees, the average salary paid by those sectors as reported by the Bureau of Economic Analysis was utilized. Thus, the payroll associated with visitor spending was \$2,482,750. This of course assumes the middle expenditure level as depicted in Table 6.

Secondary Impacts of Current Fairground Spending

Employment and income multipliers for Grady County have been calculated by use of the IMPLAN model. It was developed by the U.S. Forest Service and is a model which allows for development of county multipliers Type III employment multipliers. The county employment multiplier was found by taking the average of the three sector multipliers (retail trade sector; finance, insurance, and real estate sector; and service sector). The Type III employment multiplier was 1.65, which indicates that for each job created by direct activities, .65 jobs are created throughout Grady County due to business (indirect) and household (induced) spending. The Type III income multiplier was estimated at 1.67, which indicates that for each dollar created by the fairgrounds, .67 are created throughout Grady County due to business (indirect) and household (induced) spending. The multiplier for Grady County is low because inputs are purchased from outside the county, and many residents go outside the county to purchase goods and services (primarily Oklahoma City). Applying the employment and income multipliers to the direct employee effect and visitor spending yields an estimate of the total employment and income impact of the fairgrounds (Table 22). The total employment impact is estimated at 235 (142.5 x 1.65). The total income impact is projected at \$4,191,250 (\$2,509,750 x 1.67).

The study indicated that the visitors spend \$5,090,700 annually. It is also assumed that the employees spend \$10,800 locally at retailers. Thus, \$5,101,500 of retail sales are generated due to the fairgrounds. Assuming this is spent in Chickasha, then \$191,306 of sales taxes (3.75% rate) are collected annually due to the fairgrounds.



Impact of New Industry

Often decisionmakers ask questions relative to the impact of an industry opening or closing. A request recently came from leaders in Greer County, OK.

Direct Economic Impact

The new industry, Hanna-Sherman International, Inc., will have a large direct impact on the city of Mangum and Greer County. Employment and payroll are the important direct economic activities created in Greer County from the new industry and are the most readily available. Data for employment and payroll is local data received from Greer County decisionmakers. In Year 1, the direct employment effect will be 120 new jobs with a payroll of \$2,340,000 (Table 23). In Year 3, the direct employment will be 80 additional jobs with a payroll of \$1,560,000. These direct economic activities will continue each year as long as the new industry continues to employ at the same level.

Secondary Impacts

Employment and income multipliers for the area have been calculated by use of the IMPLAN model. The Type III employment multiplier for the aggregate manufacturing sector is 1.54. This indicates that for each job created in that sector, .54 jobs are created throughout the area due to business (indirect) and household (induced) spending. The Type III income multiplier for the aggregate durable manufacturing sector is 1.40. This indicates that for each dollar created in that sector, .40 dollars are created throughout the area due to business (indirect) and household (induced) spending.

Applying the employment and income multipliers to the new industry employment and payroll yields an estimate of total employment and income impact of the new industry on the county. For Year 1, the total employment impact is estimated at 184 new jobs (120×1.54). The total income impact is projected at \$3,276,000 ($\$2,340,000 \times 1.40$) (Table 24). Income also has an impact on retail sales. If the county ratio between retail sales and income continues as in the past several years, then direct and secondary retail sales generated by the new business and its employees equals \$687,960. The resulting sales tax would be approximately \$6,879, at a one percent sales tax level. Assuming the new industry continues in business, these impacts would be annual impacts.

For Year 3 (Table 25), the total employment impact is estimated at 123 new jobs (80×1.54). The total income impact is projected at \$2,184,000 ($\$1,560,000 \times 1.40$). It is estimated that the total (direct and secondary) retail sales generated by the new industry's employees equals \$458,640. The resulting sales tax would be approximately \$4,586, at a one percent sales tax level. Assuming the new industry remains in business, these will be annual impacts, in addition to the Year 1 impacts. The bottom line is that the new industry will contribute greatly to the economic health of the city of Mangum and Greer County.

Summary of Impact Type Studies

The IMPLAN model can be used to measure the impact of any economic activity and for any county or multi-county region. Applications completed in Oklahoma are summarized in Table 26. The applications range from a new business to recreational applications. For extension applications, it is crucial that extension either have someone on their staff capable of running the model or have contact with a researcher that has the model. With this tool, extension professionals can assist local decisionmakers as they make economic decisions.

Summary

The objective of this chapter has been to provide material and training to rural development such that he/she is ready to apply these models in communities in his/her state. The concepts presented were an overview of



planning, example community service budget studies, other community service tools and an impact assessment model. By using the methodology presented in the chapter and the reference material, rural development specialists can use their tools in his/her state. If questions or if you need reference material feel free to contact the author or this chapter.

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APPENDIX

